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(54) Single-phase composition containing a perfluorinated oil and one or more surfactant(s), useful as an excipient for cosmetic and dermatologic formulations, as well as for biomedical applications.

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**Description**

The present invention relates to a single-phase, isotropic fluid, or anisotropic composition containing a perfluorinated oil and a special surfactant defined in the following.

5 The same invention relates as well to the use of such composition as an excipient for cosmetic and dermatologic formulations.

In the art, emulsions of oil-in-water type are known, in which the oil is constituted by a perfluorinated organic compound (a perfluorinated oil), such as perfluorinated alkanes or cycloalkanes, perfluorinated amines and perfluorinated polyethers.

10 These emulsions have been used for cosmetic or dermatologic formulations, wherein their ability to form gas-permeable films is taken advantage of, such as disclosed, e.g., in EP-A-196,904.

Furthermore, some emulsions were prepared in order to have available substitutes for blood (artificial blood), wherein the solubility of oxygen and carbon dioxide in the perfluorinated oils is exploited, with the perfluorinated oils therefore performing the function of oxygen transport, such as disclosed, e.g., in US-A-15 4,325,972. This use is also reported in the "Proceedings of the 3<sup>rd</sup> Congress of International Conference on Blood Substitutes" Montreal (Canada), June 26-28 (1987).

20 In the art, also gels are known, which are capable of transporting gases, such as, e.g., those disclosed in GB-A-2,087,882. These gels are obtained by emulsifying a mixture containing water, a perfluorinated oil and a surfactant agent, concentrating the emulsion in order to form a gel phase and a liquid phase, and separating the two so-formed phases. The so obtained gel is used, inter alia, as an ointment, or a cosmetic.

25 The preparation of these emulsions can be affected by problems deriving from the selection of an efficacious emulsifier, and from the stability of the same emulsions. In any case, said preparation requires large amounts of energy, in that these emulsions are formed by sonication, or by homogenization under high pressure, by means of a shear effect.

30 In the art, also some microemulsions containing perfluorinated oils were described, which are capable of forming spontaneously, such as, e.g., those described by E. Ceschin et al. in J. Chem. Techn. Biotechnol., 35A, 73 (1985) and by G. Mathis et al., in J. Am. Chem. Soc., 1984, 106, 6162 and in FR-A No. 2,515,198.

These microemulsions known from the prior art, if on one hand overcome the problems deriving from the expenditure of energy necessary for them being formed, show, on the other hand, some problems.

35 First of all, no surfactants were found in the prior art, which would be capable of showing their efficacy when they are combined with the various perfluorinated oils known in the art. Therefore, resort was had to surfactants specific for the individual perfluorinated oils, or to mixtures of a plurality of surfactants. Furthermore, the content of perfluorinated oil in such compositions is generally low, so that the same microemulsions represent relatively poorly interesting vehicles for oxygen transport. Finally, not always the size of the particles in said microemulsions is comprised within a desired range of values.

40 The purpose of the present invention is overcoming the above outlined drawbacks of the prior art.

According to the present invention, it was found that a single-phase composition can be directly obtained, with their formation occurring spontaneously, by starting from practically any known perfluorinated oils, by using surfactants belonging to a particular class. The single-phase composition of the present invention can either be, according to the percentages of the various constituents and the size of the particles, as specified hereinunder, isotropic, transparent and fluid, or it can be an anisotropic, high-viscosity formulation.

45 By the term "anisotropic, single-phase composition", according to the present invention a homogeneous system is meant, which is constituted by perfluorinated oil, water, surfactant, and optionally co-surfactant, freely flowing, having a) Kinematic viscosity higher than  $10^{-4}$  m<sup>2</sup> (100 cstokes), showing three-dimensional non-continuous structures, as shown by measurements on optical microscope under polarized light.

50 By the term "isotropic, single-phase composition", according to the present invention a homogeneous system is meant, which is constituted by perfluorinated oil, water, surfactant, and co-surfactant, fluid, having a Kinematic viscosity comprised within the range of from  $10^{-6}$  m<sup>2</sup>/s to  $5.10^{-6}$  m<sup>2</sup>/s (1 to 50 cstokes), showing a three-dimensional continuous structure, as shown by measurements on optical microscope under polarized light.

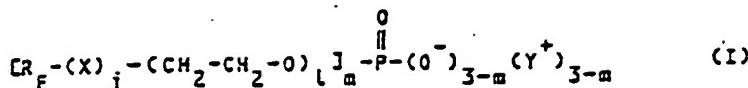
55 Said isotropic composition is endowed with characteristics of high stability to temperature and oxygen pressure, even at high concentrations of the perfluorinated oil, and is therefore useful in the application both in the cosmetic sector, and the dermatologic sector.

This invention, therefore, provides a spontaneously formed single-phase excipient composition for cosmetic and dermatologic applications, having isotropic and anisotropic forms, comprising, in combination:

(a) a perfluorinated oil;

- (b) water, and  
(c) a surfactant having the formula:

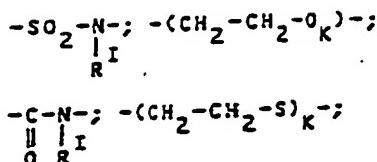
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wherein:

- 10  $\text{R}_F$  is an  $\text{F}-(\text{CF}_2\text{CF}_2)\text{i}$ - group;  
 $\text{X}$  is a group selected from:

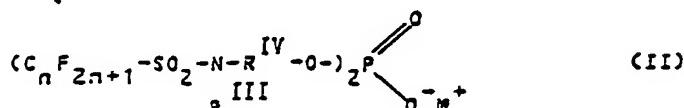
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- 20  $-(\text{CH}_2-\text{O})_k-$ ; and  $-(\text{CH}_2-\text{S})_k-$   
wherein  $\text{R}^l$  is a ( $\text{C}_1\text{-C}_4$ )-alkyl;  
 $\text{Y}$  is a group selected from:  
 $\text{NH}_2(\text{R}^{ll})_2$  and  $\text{N}(\text{R})_4$ ;  
wherein  $\text{R}^{ll}$  a hydrogen atom, or a group selected from  $-\text{CH}_2-\text{CH}_2-\text{OH}$  and ( $\text{C}_1\text{-C}_4$ )-alkyl;
- 25  $i$  is an integer comprised within the range of from 3 to 8;  
 $j$  is zero or 1;  
 $k$  is  $2.i$ ;  
 $l$  is an integer comprised within the range of from 1 to 10;  
 $m$  is 1 or 2,

30 or the formula:

35



wherein:

- 40  $n$  is an integer comprised within the range of from 3 to 10;  
 $\text{R}^{\text{III}}$  is a ( $\text{C}_1\text{-C}_3$ )-alkyl;  
 $\text{R}^{\text{IV}}$  is a ( $\text{C}_1\text{-C}_3$ )-alkylene;  
 $\text{M}^+$  is ammonium ion,

and, optionally, a co-surfactant selected from the  $\text{C}_3\text{-C}_7$  aliphatic alcohols.

In case of the isotropic form, the above-said single-phase composition is furthermore a fluid and transparent composition having a viscosity comprised within the range of from 1 to 50 cStokes, with particle size smaller than 40 nm ( $400 \text{ \AA}$ ), and containing:

- 45 (a) from 1 to 50% by weight of the perfluorinated oil;  
(b) from 1 to 50% by weight of water;  
(c) from 8 to 60% by weight of at least one surfactant selected from the surfactants having the above formula (I);  
(d) from 6 to 38% by weight of a co-surfactant, selected from ( $\text{C}_3\text{-C}_7$ )-aliphatic alcohols.

In the preferred form of practical embodiment, the isotropic, single-phase composition according to the present invention comprises:

- 50 - 15-35% by weight of the (a) component;  
- 30%-50% by weight of the (b) component;  
- 8-20% by weight of the (c) component;  
- 6-15% by weight of the (d) component;

the particle size in said composition being comprised within the range of from 8 nm to 20 nm ( $50\text{-}200 \text{ \AA}$ ).

In the particular case of the anisotropic single-phase form, the composition has a viscosity higher than  $10^{-4}$  m<sup>2</sup>/s (100 cstokes), with a particle size larger than 1  $\mu$ m (1 micron), and contains:

- (a) from 1 to 50% by weight of perfluorinated oil;
- (b) from 1 to 80% by weight of water;
- 5 (c) from 1 to 40% by weight of at least one surfactant selected from the surfactants defined by means of the general formula (I);
- (d) from 0 to 19% by weight of a co-surfactant, selected from (C<sub>3</sub>-C<sub>7</sub>)-aliphatic alcohols.

In the preferred form of practical embodiment, the anisotropic, single-phase composition according to the present invention comprises:

- 10 - 20-45% by weight of the (a) component;
- 45-70% by weight of the (b) component;
- 3-12% by weight of the (c) component; and
- 0-8% by weight of the (d) component;

the particle size in said composition being larger than 1 micron, and the viscosity of said composition being higher than  $10^{-4}$  m<sup>2</sup>/s (100 cstokes).

The perfluorinated oils useful for the purposes of the present invention are those known in the art, and generally belonging to the following classes of compounds: perfluorinated alkanes and cycloalkanes; perfluorinated amines, non-cyclic or cyclic perfluorinated ethers; and perfluorinated heterocyclic compounds.

20 Examples of perfluorinated alkanes are perfluoroheptane and perfluoro-octane.

Examples of perfluorinated cycloalkanes are perfluoro-alkyl-cyclohexanes, containing from 1 to 3 carbon atoms in their alkyl group; (cis and trans) perfluorodecalin; and perfluoro-alkyl-decalins containing from 1 to 3 carbon atoms in the alkyl group.

25 Examples of perfluorinated amines are perfluorinated aliphatic amines and perfluorinated alicyclic amines, such as perfluoro-tripropyl-amine; perfluoro-tributylamine; perfluoro-triamyl-amine and perfluoro-N,N-dialkylcyclohexyl-amines, wherein the alkyl group contains from 1 to 6 carbon atoms. Examples of perfluoro-N,N-dialkylcyclohexyl-amines are perfluoro-N,N-dimethyl-cyclohexylamine; perfluoro-N,N-diethyl-cyclohexyl-amine; and perfluoro-N,N-dibutyl-cyclohexyl-amine.

30 Examples of perfluoroethers are perfluoro-alkyltetrahydrofuran and perfluoro-alkyl-tetrahydropyran, containing from 1 to 7 carbon atoms in their alkyl group, and the products available from the market under the following trade names:

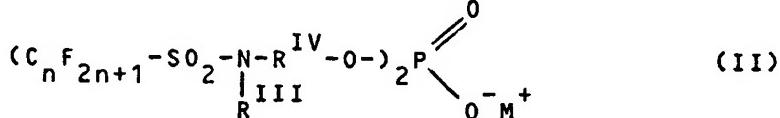
- FOMBLIN<sup>(R)</sup> (e.g.: FOMBLIN<sup>(R)</sup> Y04, Y25 and YR) by Montefluos;
- GALDEM<sup>(R)</sup> (e.g.: GALDEM<sup>(R)</sup> ME) by MONTEFLUOS;
- FR-80<sup>(R)</sup> by 3M; and

35 - RM 101<sup>(R)</sup> by Enichem Sintesi.

Examples of perfluorinated heterocyclic compounds are perfluoroalkyl-piperidines and perfluoroalkylmorpholines, wherein the alkyl group contains from 1 to 7 carbon atoms.

Mixtures of two or more perfluorinated oils can be used.

A preferred surfactant for the purposes of the present invention is that already defined by means of the 40 following formula (II):



wherein:

- 50 n is an integer comprised within the range of from 3 to 10;
- R<sup>III</sup> is a (C<sub>1</sub>-C<sub>3</sub>)-alkyl;
- R<sup>IV</sup> is a (C<sub>1</sub>-C<sub>3</sub>)-alkylene;
- M<sup>+</sup> is ammonium ion.

A very preferred surfactant for the purposes of the present invention is the one as defined by above 55 formula (II), wherein:

- n is 8;
- R<sup>III</sup> is ethyl;
- R<sup>IV</sup> is ethylidene; and

- M<sup>+</sup> is ammonium ion.

The monoester/diester mixture, with monoester/diester percentages comprised within the range of from 0-50% to 100-50% can be used as well.

The preferred co-surfactant is isopropanol.

5 The anisotropic single-phase composition of the present invention is spontaneously formed when the components are simply contacted with one another, by operating at room temperature (20-25°C), or at higher than room temperatures, up to approximately 50°C, as a function of the nature of the perfluorinated oil used, in particular of its vapour pressure. The modalities and the order of contact of the components are not critical.

10 The anisotropic single-phase composition of the present invention is endowed with characteristics of high stability to temperature, to oxygen pressure and to the storage under normal room conditions.

Said composition can be formulated into creams for cosmetic and dermatologic use, which have a high film-forming and coating power, a strong hydrophobic character, and absolute absence of toxicity and a strong ability to dissolve oxygen and to supply oxygen to tissues. In particular, creams for hand care, for 15 sun shielding, for protection from cold, for the management of burns, for anti-wrinkle treatment, and the like, can be obtained. The active agents, useful for the intended purpose, are those as normally used in the art, including the materials of proteinic nature.

The process of preparation of the creams is advantageously carried out by dissolving the water-soluble active principles in the aqueous phase, and then placing said aqueous phase in contact with the 20 perfluorinated oil, in which the oil-soluble active principles have been previously dissolved.

Also the isotropic, single-phase composition of the present invention spontaneously forms when the components are simply contacted with one another, by operating at room temperature (20-25°C), or at temperatures close to room temperatures.

As in the previous case, the modalities of contact of components are not critical, but, according to a 25 preferred form of practical embodiment, the perfluorinated oil is placed into contact with an aqueous solution of the surfactant and of the co-surfactant.

The isotropy of the composition according to the present invention can be verified by observation on optical microscope under polarized light, and by means of centrifugation, rheologic and turbidimetric measurements.

30 The isotropic single-phase composition of the present invention is endowed with characteristics of high temperature stability, stability to oxygen pressure and to storage, as it will clearly result from the hereinunder reported experimental examples.

Said isotropic, single-phase composition is useful in the cosmetic and dermatologic sectors.

In the preparation of the cosmetic or dermatologic compositions, the process is carried out like in case 35 of the anisotropic composition.

The following experimental examples are illustrating the present invention.

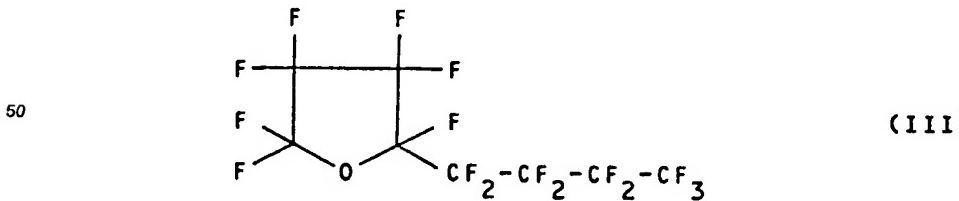
#### Example 1

##### 40 (a) Test

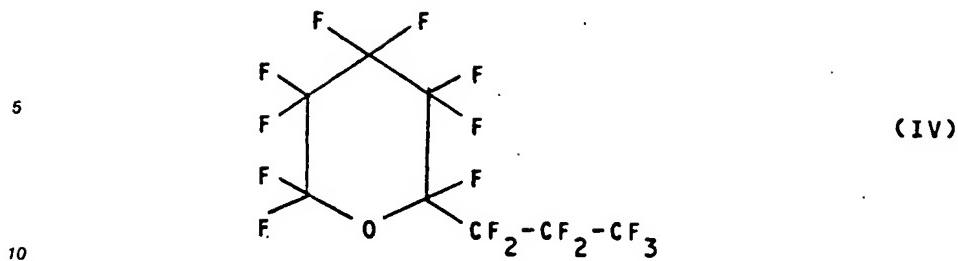
As the perfluorinated oil, the commercial product RM 101® by Enichem Sintesi is used.

RM 101® is a mixture of perfluoroethers containing 55.6% by weight of perfluoro-1-n-butyl-tetrahydrofuran:

45



55 and 18.5% by weight of perfluoro-1-n.propyl-tetrahydropyran:



with the balance to 100% being constituted by isomers of compounds (III) and (IV).

0.3488 g is prepared of an aqueous solution containing 0.043 g of isopropanol and 0.1046 g of the surfactant represented by formula (II), in which:

- 15      n      is 8,  
       R      is ethyl,  
       R<sup>I</sup>      is ethyldene, and  
       M<sup>+</sup>      is ammonium ion.

This solution is added to 0.3562 g of perfluorinated oil RM 101®, by operating at room temperature (20-20 25 °C).

An isotropic single-phase, transparent composition forms, which has a viscosity of  $2.10^{-5}$  m<sup>2</sup>/s (20 centistokes) and contains, as percentages by weight:

- 25      - RM 101<sup>(R)</sup> 34%  
       - Surfactant 10%  
       - Isopropanol 7%  
       - Water 49%

#### (b) Test

30      To 0.9164 g of RM 101<sup>(R)</sup>, 2.3982 g of an aqueous solution containing 0.7194 of the same surfactant as of the (a) Test, and 0.5036 g of isopropanol is added. 0.229 g of water is then added. All operations are carried out at room temperature.

An isotropic single-phase and transparent composition is obtained, which has a kinematic viscosity of approximately  $10^{-5}$  m<sup>2</sup>/s (10 cts), and contains, as percentages by weight:

- 35      - RM 101<sup>(R)</sup> 29.5%  
       - Surfactant 20.3%  
       - Isopropanol 14.2%  
       - Water 39.6%

The so-obtained composition is submitted to the following treatments: 48 hours at 0 °C, then heating to 40 80 °C and standing at this temperature for 24 hours.

This treatment is repeated a plurality of times, with the characteristics of the composition not undergoing any alterations, as determined by observation on optical microscope under polarized light.

Furthermore, the composition remains unchanged after a treatment of centrifugation at 100 G for 10 minutes. Finally, the composition maintains its characteristics of isotropy, single-phase nature, fluidity and transparency unchanged after a one-month storage under room conditions.

#### (c) Test

To 0.8694 g of an aqueous solution containing 0.2602 g of the same surfactant as of the (a) Test and 50 0.1826 g of isopropanol, 0.3203 g of RM 101® is added, by operating at room temperature.

An isotropic single-phase and transparent composition is obtained, which contains, as percentages by weight:

- 55      - RM 101®      26.9%  
       - Surfactant      21.8%  
       - Isopropanol      15.5%  
       - Water      35.8%

To the so-obtained composition, 0.4509 g of RM 101® and 0.2462 g of water are added by operating at room temperature, and an isotropic single-phase and transparent composition is obtained, which contains,

as percentages by weight:

- RM 101® 40.9%
- Surfactant 13.7%
- Isopropanol 9.8%
- Water 35.6%

5 By means of successive additions of RM 101® and of water, the formation of a gel, and of an emulsion is caused, and then a phase separation is reached.

(d) Test

10 To 0.7597 g of an aqueous solution containing 0.2260 g of the same surfactant as of the (a) Test and 0.1615 g of isopropanol, 0.2227 g of water is added. An anisotropic system is obtained, with liquid crystals being formed. To this system, 0.2911 g of RM 101® is added. All operations are carried out by operating at room temperature.

15 An isotropic single-phase, transparent and fluid composition is obtained, which contains, as percentages by weight:

- RM 101® 22.8%
- Surfactant 17.8%
- Isopropanol 12.7%
- Water 46.7%

(e) Test

25 0.3578 g of the same surfactant as of the (a) Test is weighed and is added to 0.2570 g of isopropanol, and 0.4389 g of water. An isotropic, transparent and fluid solution is obtained.

To such a solution, 0.1390 g of RM 101® is added. All operations are carried out at room temperature.

An isotropic single-phase, transparent and fluid composition is obtained, which contains, as percentages by weight:

- RM 101® 11.6%
- Surfactant 29.2%
- Isopropanol 22.5%
- Water 36.7%

(f) Test

35 0.2330 g of the same surfactant as of the (a) Test is weighed and 0.1800 g of isopropanol, and 0.1172 g of water are added. An isotropic and transparent solution is obtained.

To such a solution, 0.1386 g of RM 101® is added. All operations are carried out at room temperature.

An isotropic single-phase, transparent and fluid composition is obtained, which contains, by weight:

- RM 101® 20.8%
- Surfactant 36 %
- Isopropanol 25.7%
- Water 17.5%

45 Example 2

Effect of isopropanol concentration on the compositions containing RM 101®, water and the same surfactant as of the (a) Test of Example 1.

50 In this Example, all operations are carried out at room temperature.

(a) Test

55 To 0.0689 g of the surfactant, 0.0924 g of water is added. An anisotropic, high-viscosity, single-phase system is formed. To such a system, 0.3451 g of RM 101® is added, in the form of a plurality of successive aliquots.

At the end of the addition, an anisotropic, single-phase and fluid composition is obtained.

## (b) Test

To 0.1256 g of surfactant, 0.5744 g of RM 101® is added, and an anisotropic, high-viscosity and single-phase system is obtained. By adding 2.2484 g of water, an anisotropic, single-phase, fluid composition is formed.

## (c) Test

To 0.5007 g of an aqueous solution of the surfactant, containing 0.1502 g of surfactant, 0.1052 g of isopropanol and 0.2453 g of water; 0.0666 g of isopropanol is added. An anisotropic single-phase, fluid and transparent system is obtained. To this system, 0.0682 g of RM 101® is then added, and an isotropic single-phase, transparent and fluid composition is obtained, which contains, as percentages by weight:

-	RM 101®	10.7%
-	Surfactant	23.6%
15	- Isopropanol	27.1%
-	Water	38.6%

## Example 3

20 To 0.8577 g of an aqueous solution of the same surfactant as of Example 1, (a) Test, containing 0.2552 g of surfactant, 0.1822 g of isopropanol and 0.4203 g of water; 0.4313 g of perfluoro-trans-decalin is added. An anisotropic single-phase, fluid and transparent system is obtained, which contains, as percentages by weight:

-	Perfluoro-trans-decalin	33.5%
25	- Surfactant	19.8%
-	Isopropanol	14.1%
-	Water	32.6%

## Example 4

30 To 1.1810 g of an aqueous solution of the same surfactant as of Example 1, (a) Test, containing 0.3513 g of surfactant, 0.2540 g of isopropanol and 0.5787 g of water, 0.5787 g of water is added, 0.1050 g of the commercial perfluoro-ether Galdem® ME by Montefluos is added.

An isotropic single-phase, fluid and transparent composition is obtained, which contains, as percentages by weight:

-	Galdem® ME	8.2%
35	- Surfactant	27.3%
-	Isopropanol	19.5%
-	Water	45 %

## Example 5

40 To 0.7480 g of an aqueous solution of the same surfactant as of Example 1, (a) Test, containing 0.2225 g of surfactant, 0.1590 g of isopropanol and 0.3665 g of water; 0.4421 g of perfluoro-methyl-morpholine is added.

An isotropic single-phase, fluid and transparent composition is obtained, which contains, as percentages by weight:

-	perfluoro-methyl-morpholine	32.7%
50	- Surfactant	17.8%
-	Isopropanol	13.3%
-	Water	30.8%

## Example 6

55 To 0.5732 g of an aqueous solution of the same surfactant as of Example 1, (a) Test, containing 0.1696 g of surfactant, 0.1213 g of isopropanol and 0.2793 g of water; 0.0895 g of perfluoro-N,N-tributyl-amine (RM 175®, a commercial product by Enichem Sintesi) is added.

An isotropic single-phase, fluid and transparent system is obtained, which contains, as percentages by

**weight:**

- perfluoro-N,N-tributyl-amine	14 %
- Surfactant	25.7%
- Isopropanol	18.3%
5 - Water	42 %

**Example 7**

To 0.7448 g of an aqueous solution of the same surfactant as of Example 1, (a) Test, containing 0.2216 g of surfactant, 0.1582 g of isopropanol and 0.3650 g of water; 0.0571 g of perfluoro-N,N-tripentyl-amine (RM 200®, a commercial product by Enichem Sintesi) is added.

An isotropic single-phase, fluid and transparent composition is obtained, which contains, as percentages by weight:

- perfluoro-N,N-tripentyl-amine	7.1%
15 - Surfactant	27.6%
- Isopropanol	19.8%
- Water	45.5%

**Example 8**

To 1.4516 g of an aqueous solution of the same surfactant as of Example 1, (a) Test, containing 0.4318 g of surfactant, 0.3085 g of isopropanol and 0.7113 g of water; 0.1702 g of perfluoro-ethyl-cyclohexylamine is added.

An isotropic single-phase, fluid and transparent composition is obtained, which contains, as percentages by weight:

- perfluoro-ethyl-cyclohexylamine	10.5%
- Surfactant	26.6%
- Isopropanol	19 %
- Water	43.9%

**Example 9****Effect of oxygen pressure on the composition.**

To 1.0305 g of RM 101®, 2.5070 g of an aqueous solution of the same surfactant as of Example 1, (a) Test, containing 0.7521 g of surfactant, 0.5266 g of isopropanol and 1.2283 g of water, is added. Subsequently, 0.2020 g of water is added. The mixing is carried out at room temperature, under an oxygen pressure of 4,053 bar (3 atm).

An isotropic single-phase, fluid and transparent composition is obtained, which contains, as percentages by weight:

- RM 101®	27.7%
- Surfactant	20.1%
- Isopropanol	14.1%
- Water	38.1%

**Example 10****Effect of the salts on the stability of the composition.**

100 g of water is weighed. 0.381 g of NaCl, 0.226 g of KCl, 0.0465 g of MgCl<sub>2</sub>, 0.070 g of CaCl<sub>2</sub> and 0.069 g of NaH<sub>2</sub>PO<sub>4</sub> is added, and the pH value of the resulting solution is adjusted at 7.0 by means of the addition of Na<sub>2</sub>CO<sub>3</sub>.

To 0.9020 g of RM 101®, 2.3020 g of an aqueous solution of the same surfactant as of Example 1, (a) Test, containing 0.6906 g of surfactant, 0.4834 g of isopropanol and 1.1280 g of water is added. Subsequently, 0.220 g of the saline solution prepared as disclosed at the beginning of the present Example is added. The operations are carried out at room temperature.

An isotropic single-phase, fluid and transparent composition is obtained, which contains, as percentages by weight:

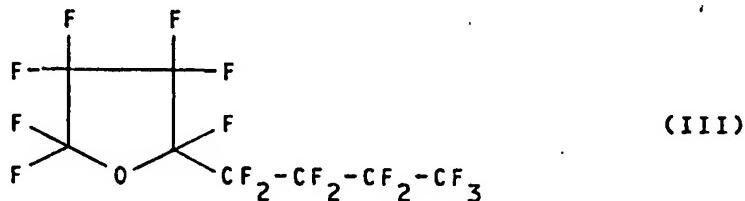
- RM 101<sup>(R)</sup> 26.3%
- Surfactant 20.2%
- Isopropanol 14.1%
- Saline solution 39.4%

5

Example 11

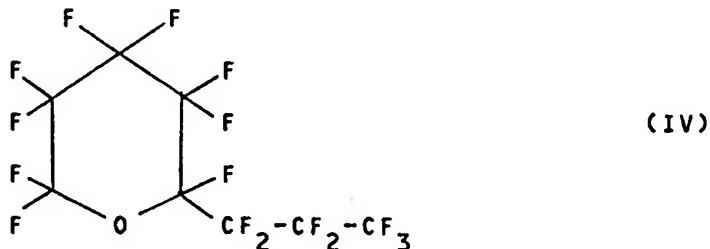
As the perfluorinated oil, the commercial product RM 101<sup>®</sup> by Enichem Sintesi is used.

RM 101<sup>®</sup> is a mixture of perfluoroethers containing 55.6% by weight of perfluoro-1-n.buty1-tetrahydrofuran:



20

and 18.5% by weight of perfluoro-1-n.propyl-tetrahydropyran:



with the balance to 100% being constituted by isomers of compounds (III) and (IV).

35 The same surfactant as represented by formula (II) is used, in which:

- n is 8,
- R is ethyl,
- R' is ethylidene, and
- M<sup>+</sup> is ammonium ion.

40 By operating at room temperature (20-25 °C), to 0.0689 g of the surfactant, 0.0924 g of water and 0.0269 g of RM 101<sup>®</sup> are added.

An anisotropic single-phase, high-viscosity composition spontaneously forms, which contains, as percentages by weight:

- |                       |       |
|-----------------------|-------|
| - RM 101 <sup>®</sup> | 14 %  |
| - Surfactant          | 36.6% |
| - Water               | 49.4% |

Example 12

50 To 0.1256 g of the same surfactant as disclosed in Example 11, 0.5744 g of RM 101<sup>®</sup> and 0.5533 g of water are added.

The process is carried out at room temperature, and an anisotropic single-phase, high-viscosity composition spontaneously forms, which contains, as percentages by weight:

- |                       |       |
|-----------------------|-------|
| - RM 101 <sup>®</sup> | 45.8% |
| - Surfactant          | 10 %  |
| - Water               | 44.2% |

Example 13

To 5.0200 g of RM 101®, 1.4029 g of the same surfactant as disclosed in Example 11, 0.9814 g of isopropanol, and 7.665 g of water are added.

The process is carried out at room temperature, and an anisotropic single-phase, high-viscosity composition is obtained, which contains, as percentages by weight:

5	- RM 101®	33.3%
	- Surfactant	9.3%
	- Isopropanol	6.5%
	- Water	50.9%

### 10 Example 14

To 0.9412 g of RM 101®, 0.3788 g of the same surfactant as disclosed in Example 11, 0.2651 g of isopropanol, and 2.131 g of water are added.

The process is carried out at room temperature, and an anisotropic single-phase, high-viscosity composition is obtained, which contains, as percentages by weight:

- RM 101® 18.6%
- Surfactant 7.5%
- Isopropanol 5.2%
- Water 68.7%

20

To 0.4434 g of a mixture of the same surfactant as disclosed in Example 11 and isopropanol (0.2586 g

25 The process is carried out at room temperature, and an anisotropic single-phase, high-viscosity

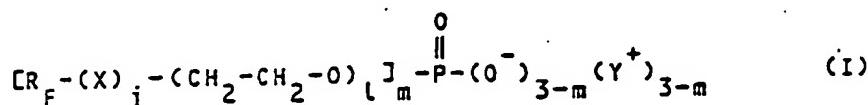
- RM 101® 38 %
- Surfactant 8.9%
- Isopropanol 6.4%
- Water 46.7%

## **Claims**

**Claims for the following Contracting States : AT, BE, CH, DE, FR, GB, LI, LU, NL, SE**

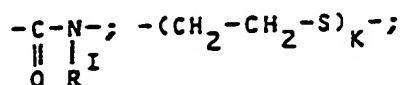
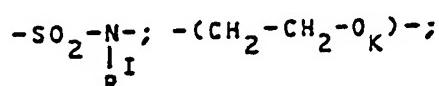
35 1. A spontaneously formed single-phase excipient composition for cosmetic and dermatologic applications, having isotropic or anisotropic forms, comprising, in combination:

- (a) a perfluorinated oil;
- (b) water, and
- (c) a surfactant having the formula:



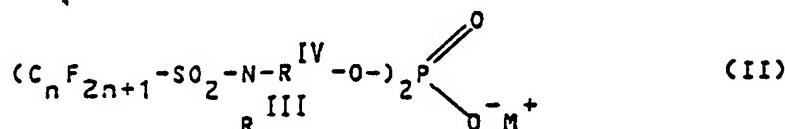
wherein:

R<sub>F</sub> is an F(CF<sub>2</sub>-CF<sub>2</sub>)<sub>i</sub>- group;  
 X is a group selected from:



- $(CH_2-O)_K$ -; and - $(CH_2-S)_K$ -;

wherein R<sup>I</sup> is a (C<sub>1</sub>-C<sub>4</sub>)-alkyl;  
 Y is a group selected from:  
 NH<sub>2</sub>(R<sup>II</sup>)<sub>2</sub> and N(R<sup>II</sup>)<sub>4</sub>;  
 wherein R<sup>II</sup> is a hydrogen atom, or a group selected from -CH<sub>2</sub>-CH<sub>2</sub>-OH and (C<sub>1</sub>-C<sub>4</sub>)-alkyl;  
 i is an integer comprised within the range of from 3 to 8;  
 j is zero or 1;  
 K is 2.I;  
 l is an integer comprised within the range of from 1 to 10;  
 m is 1 or 2,  
 or the formula:



wherein:

n is an integer comprised within the range of from 3 to 10;  
 R<sup>III</sup> is a (C<sub>1</sub>-C<sub>3</sub>)-alkyl;  
 R<sup>IV</sup> is a (C<sub>1</sub>-C<sub>3</sub>)-alkylene;  
 M<sup>+</sup> is ammonium ion,

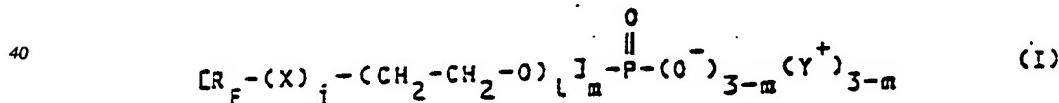
and, optionally, a co-surfactant selected from the C<sub>3</sub>-C<sub>7</sub> aliphatic alcohols.

2. Composition according to Claim 1, wherein the composition is isotropic, fluid, has a kinematic viscosity of from 10<sup>-6</sup> m<sup>2</sup>/s to 5.10<sup>-5</sup> m<sup>2</sup>/s (from 1 to 50 cSt), has a particle size smaller than 40 nm (400 Å), and consists of:
  - (a) from 1% to 50% by weight of the perfluorinated oil;
  - (b) from 1% to 50% by weight of water;
  - (c) from 8% to 60% by weight of the surfactant, and
  - (d) from 6% to 38% by weight of the co-surfactant.
3. Composition according to Claim 2, wherein the particle size is from 5 nm to 20 nm (from 50 Å to 200 Å) and the composition consists of:
  - (a) from 15% to 35% by weight of the perfluorinated oil;
  - (b) from 30% to 50% by weight of water;
  - (c) from 8% to 20% by weight of the surfactant, and
  - (d) from 6% to 15% by weight of the co-surfactant.
4. Composition according to Claim 1, wherein the composition is anisotropic, has a kinematic viscosity higher than 10<sup>-4</sup> m<sup>2</sup>/s (100 cSt), and a particle size larger than 1 µm (1 micron), and consists of:
  - (a) from 1% to 50% by weight of the perfluorinated oil;
  - (b) from 1% to 80% by weight of water;
  - (c) from 1% to 40% by weight of the surfactant, and
  - (d) from 0% to 19% by weight of the co-surfactant.
5. Composition according to Claim 4, comprising:
  - (a) from 20% to 45% by weight of the perfluorinated oil;
  - (b) from 45% to 70% by weight of water;
  - (c) from 3% to 12% by weight of the surfactant, and
  - (d) from 0% to 8% by weight of the co-surfactant.
6. Composition according to claim 1, wherein the perfluorinated oil is selected from perfluorinated alkanes and cycloalkanes; perfluorinated amines; non-cyclic or cyclic perfluorinated ethers; and perfluorinated heterocyclic compounds.

7. Composition according to claim 6, wherein the perfluorinated oil is selected from perfluoro-heptane; perfluoro-octane; perfluoro-alkyl-cyclohexanes, containing from 1 to 3 carbon atoms in their alkyl group; perfluorodecalin; perfluoro-alkyl-decalins containing from 1 to 3 carbon atoms in their alkyl group; perfluoro-tripropyl-amine; perfluoro-tributyl-amine; perfluoro-triamyl-amine; perfluoro-N,N-dialkyl-cyclohexyl-amines containing from 1 to 6 carbon atoms in their alkyl group; perfluoro-alkyl-tetrahydrofurans containing from 1 to 7 carbon atoms in their alkyl group; perfluoro-alkyl-tetrahydropyrans containing from 1 to 7 carbon atoms in their alkyl group; perfluoroalkyl-piperidines containing from 1 to 7 carbon atoms in their alkyl group; perfluoroalkyl-morpholines containing from 1 to 7 carbon atoms in their alkyl group; and relevant mixtures.
- 10 8. Composition according to claim 1, wherein the co-surfactant, if present, is isopropyl alcohol.
9. Use of the composition according to Claim 1 for formulating creams for cosmetic and dermatologic applications.
- 15 10. Process for producing a composition according to Claim 1, comprising the step of blending the perfluorinated oil, the water, the surfactant and optionally the co-surfactant, the composition forming spontaneously by the blending of the reactants.
- 20 11. Process according to Claim 10 to produce the composition in fluid, isotropic form, having a kinematic viscosity of from  $10^{-6}$  m<sup>2</sup>/s to  $5.10^{-5}$  m<sup>2</sup>/s (from 1 to 50 cSt) and a particle size smaller than 40 nm (400 Å), comprising the step of blending together from 1% to 50% by weight of the perfluorinated oil, from 1% to 50% by weight of the water, from 8% to 60% by weight of the surfactant, and from 6% to 38% by weight of the co-surfactant.
- 25 12. Process according to Claim 11 to produce the composition in anisotropic form, having a kinematic viscosity higher than  $10^{-4}$  m<sup>2</sup>/s (100 cSt) and a particle size larger than 1 um (1 micron), comprising the step of blending together from 1% to 50% by weight of the perfluorinated oil, from 1% to 80% by weight of the water, from 1% to 40% by weight of the surfactant, and from 0% to 19% by weight of the co-surfactant.
- 30

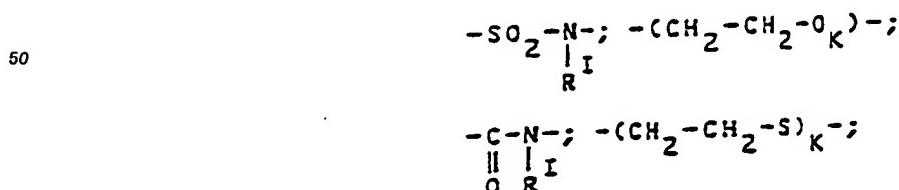
**Claims for the following Contracting States : ES, GR**

1. Process for preparing a spontaneously formed single-phase excipient composition for cosmetic and dermatologic applications, said composition having isotropic or anisotropic forms, comprising the step 35 of blending a perfluorinated oil, water, a surfactant having the formula:



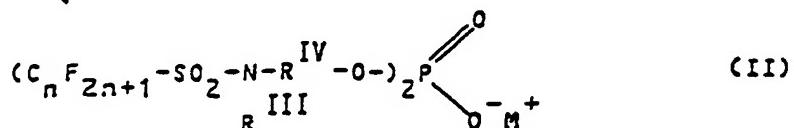
wherein:

- 45  $R_F$  is an  $F-(CF_2-CF_2)_n$ -group;  
 $X$  is a group selected from:



$-(CH_2-O)_K^-$ ; and  $-(CH_2-S)_K^-$ ;  
 wherein  $R^1$  is a ( $C_1-C_4$ )-alkyl;

Y is a group selected from:  
 $\text{NH}_2(\text{R}^{\text{II}})_2$  and  $\text{N}(\text{R}^{\text{II}})_4$ ;  
 wherein  $\text{R}^{\text{II}}$  is a hydrogen atom, or a group selected from  $-\text{CH}_2-\text{CH}_2-\text{OH}$  and  $(\text{C}_1-\text{C}_4)$ -alkyl;  
 i is an integer comprised within the range of from 3 to 8;  
 5 j is zero or 1;  
 K is 2.i;  
 l is an integer comprised within the range of from 1 to 10;  
 m is 1 or 2,  
 or the formula:  
 10



wherein:

n is an integer comprised within the range of from 3 to 10;  
 20  $\bar{\text{R}}^{\text{III}}$  is a  $(\text{C}_1-\text{C}_3)$ -alkyl;  
 $\text{R}^{\text{IV}}$  is a  $(\text{C}_1-\text{C}_3)$ -alkylene;  
 $\text{M}^+$  is ammonium ion,

25 and, optionally, a co-surfactant selected from the C3-C7 aliphatic alcohols.

2. Process according to Claim 1, wherein the composition is isotropic, fluid, has a kinematic viscosity of from  $10^{-6}$  m<sup>2</sup>/s to  $5.10^{-5}$  m<sup>2</sup>/s (from 1 to 50 cSt), has a particle size smaller than 40 nm (400 Å), and consists of:  
 30 (a) from 1% to 50% by weight of the perfluorinated oil;  
 (b) from 1% to 50% by weight of water;  
 (c) from 8% to 60% by weight of the surfactant, and  
 (d) from 6% to 38% by weight of the co-surfactant.

- 35 3. Process according to Claim 2, wherein the particle size is from 5 nm to 20 nm (from 50 Å to 200 Å) and the composition consists of:  
 (a) from 15% to 35% by weight of the perfluorinated oil;  
 (b) from 30% to 50% by weight of water;  
 40 (c) from 8% to 20% by weight of the surfactant, and  
 (d) from 6% to 15% by weight of the co-surfactant.

- 45 4. Process according to Claim 1, wherein the composition is anisotropic, has a kinematic viscosity higher than  $10^{-4}$  m<sup>2</sup>/s (100 cSt), and a particle size larger than 1 μm (1 micron), and consists of:  
 (a) from 1% to 50% by weight of the perfluorinated oil;  
 (b) from 1% to 80% by weight of water;  
 50 (c) from 1% to 40% by weight of the surfactant, and  
 (d) from 0% to 19% by weight of the co-surfactant.

- 55 5. Process according to Claim 4, comprising:  
 (a) from 20% to 45% by weight of the perfluorinated oil;  
 (b) from 45% to 70% by weight of water;  
 (c) from 3% to 12% by weight of the surfactant, and  
 (d) from 0% to 8% by weight of the co-surfactant.

6. Process according to claim 1, wherein the perfluorinated oil is selected from perfluorinated alkanes and cycloalkanes; perfluorinated amines; non-cyclic or cyclic perfluorinated ethers; and perfluorinated heterocyclic compounds.

7. Process according to claim 6, wherein the perfluorinated oil is selected from perfluoro-heptane; perfluoro-octane; perfluoro-alkyl-cyclohexanes, containing from 1 to 3 carbon atoms in their alkyl group; perfluorodecalin; perfluoro-alkyl-decalins containing from 1 to 3 carbon atoms in their alkyl group; perfluoro-tripropyl-amine; perfluoro-tributyl-amine; perfluoro-triamyl-amine; perfluoro-N,N-dialkyl-cyclohexyl-amines containing from 1 to 6 carbon atoms in their alkyl group; perfluoro-alkyl-tetrahydrofurans containing from 1 to 7 carbon atoms in their alkyl group; perfluoro-alkyl-tetrahydropyrans containing from 1 to 7 carbon atoms in their alkyl group; perfluoroalkyl-piperidines containing from 1 to 7 carbon atoms in their alkyl group; perfluoroalkyl-morpholines containing from 1 to 7 carbon atoms in their alkyl group; and relevant mixtures.

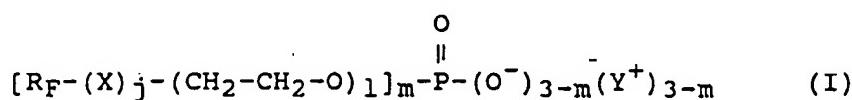
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**Revendications****Revendications pour les Etats contractants suivants : AT, BE, CH, DE, FR, GB, LI, LU, NL, SE**

15

1. Composition d'excipient mono-phasique formée spontanément, pour applications cosmétiques ou dermatologiques, présentant des formes isotropes ou des formes anisotropes, et comprenant, en combinaison :
- une huile perfluorée,
  - de l'eau, et
  - un tensio-actif présentant la formule :

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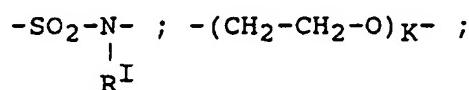


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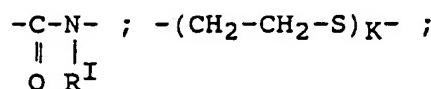
dans laquelle :

$R_F^-$  est un groupe  $F-(CF_2-CF_2)_i^-$  ;  
 $X$  est un groupe choisi parmi :

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$R^I$  représentant un groupe alkyle en  $C_1-C_4$  ;  
 $Y$  est un groupe choisi parmi :  $NH_2(R^II)_2$  et  $N(R^II)_4$

45

dans lequel  $R^II$  représente un atome d'hydrogène ou un groupe choisi parmi  $-CH_2-CH_2-OH$  et alkyle en  $C_1-C_4$  ;

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$i$  est un nombre entier situé dans l'intervalle allant de 3 à 8 ;

$j$  vaut 0 ou 1 ;

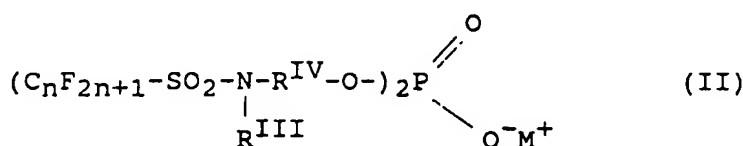
$K$  vaut 2 ;

$l$  est un nombre entier situé dans l'intervalle allant de 1 à 10 ;

$m$  vaut 1 ou 2,

ou bien la formule :

55



dans laquelle

n est un nombre entier situé dans l'intervalle allant de 3 à 10 ;

R<sup>III</sup> est un groupe alkyle en C<sub>1</sub>-C<sub>3</sub> ;

R<sup>IV</sup> est un groupe alkylène en C<sub>1</sub>-C<sub>3</sub> ;

M<sup>+</sup> est un ion ammonium ;

et éventuellement, un co-tensio-actif choisi parmi les alcools aliphatiques en C<sub>3</sub>-C<sub>7</sub>.

2. Composition conforme à la revendication 1, qui est une composition fluide isotrope, qui présente une viscosité cinématique valant de 10<sup>-6</sup> m<sup>2</sup>/s à 5.10<sup>-5</sup> m<sup>2</sup>/s (de 1 à 50 cSt), qui possède une taille de particule inférieure à 40 nm (400 Å), et qui est constituée de :
- (a) 1% à 50% en poids d'huile perfluorée,
  - (b) 1% à 50% en poids d'eau,
  - (c) 8% à 60% en poids d'un tensio-actif, et
  - (d) 6% à 38% en poids d'un co-tensio-actif.
3. Composition conforme à la revendication 2, dans laquelle la taille de particule vaut de 5 nm à 20 nm (de 50 Å à 200 Å) et qui est constituée de :
- (a) 15% à 35% en poids d'huile perfluorée,
  - (b) 30% à 50% en poids d'eau,
  - (c) 8% à 20% en poids d'un tensio-actif, et
  - (d) 6% à 15% en poids d'un co-tensio-actif.
4. Composition conforme à la revendication 1, qui est anisotrope, qui présente une viscosité cinématique supérieure à 10<sup>-4</sup> m<sup>2</sup>/s (100 cSt) et une taille de particule supérieure à 1 µm (1 micron), et qui est constituée de :
- (a) 1% à 50% en poids d'huile perfluorée,
  - (b) 1% à 80% en poids d'eau,
  - (c) 1% à 40% en poids d'un tensio-actif, et
  - (d) 0% à 19% en poids d'un co-tensio-actif.
5. Composition conforme à la revendication 4, comprenant :
- (a) 20% à 45% en poids d'huile perfluorée,
  - (b) 45% à 70% en poids d'eau,
  - (c) 3% à 12% en poids d'un tensio-actif, et
  - (d) 0% à 8% en poids d'un co-tensio-actif.
6. Composition conforme à la revendication 1, dans laquelle l'huile perfluorée est choisie parmi les alcanes et cyclo alcanes perfluorés, les amines perfluorées, les éthers perfluorés, cycliques ou non, et les composés hétérocycliques perfluorés.
7. Composition conforme à la revendication 6, dans laquelle l'huile perfluorée est choisie parmi le perfluoroheptane, le perfluoro-octane, les perfluoro-alkyl-cyclohexanes dont le groupe alkyle comporte de 1 à 3 atomes de carbone, la perfluoro-décaline, les perfluoro-alkyl-décalines dont le groupe alkyle comporte de 1 à 3 atomes de carbone, la perfluoro-tripropyl-amine, la perfluoro-tributyl-amine, la perfluoro-triamyl-amine, les perfluoro-N,N-dialkyl-cyclohexylamines dont les groupes alkyle comportent de 1 à 6 atomes de carbone, les perfluoro-alkyl-tétrahydrofurannes dont le groupe alkyle comporte de 1 à 7 atomes de carbone, les perfluoro-alkyl-tétrahydropyrannes dont le groupe alkyle comporte de 1 à 7 atomes de carbone, les perfluoro-alkyl-pipéridines dont le groupe alkyle comporte de 1 à 7 atomes de carbone, les perfluoro-alkyl-morpholines dont le groupe alkyle comporte de 1 à 7 atomes de carbone, et les mélanges de ces composés.
8. Composition conforme à la revendication 1, dans laquelle le co-tensio-actif, s'il y en a, est de l'alcool isopropylique.
9. Utilisation de la composition conforme à la revendication 1, pour la formulation de crèmes destinées à des applications cosmétiques ou dermatologiques.
10. Procédé de production d'une composition conforme à la revendication 1, comprenant l'étape de

mélange de l'huile perfluorée, de l'eau, du tensio-actif et éventuellement du co-tensio-actif, la composition se formant spontanément lors du mélange des réactifs.

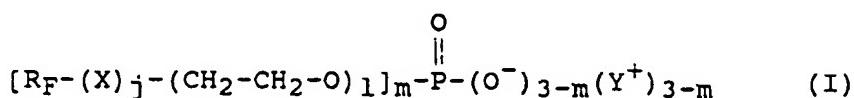
11. Procédé conforme à la revendication 10, pour produire une composition sous forme fluide isotrope, présentant une viscosité cinématique valant de  $10^{-6}$  m<sup>2</sup>/s à  $5.10^{-5}$  m<sup>2</sup>/s (de 1 à 50 cSt) et une taille de particule inférieure à 40 nm (400 Å), lequel procédé comporte l'étape consistant à mélanger ensemble de 1% à 50% en poids d'huile perfluorée, de 1% à 50% en poids d'eau, de 8% à 60% en poids d'un tensio-actif et de 6% à 38% en poids d'un co-tensio-actif.
- 10 12. Procédé conforme à la revendication 10, pour produire une composition sous forme anisotrope, présentant une viscosité cinématique supérieure à  $10^{-4}$  m<sup>2</sup>/s (100 cSt) et une taille de particule supérieure à 1 µm (1 micron), lequel procédé comporte l'étape consistant à mélanger ensemble de 1% à 50% en poids d'huile perfluorée, de 1% à 80% en poids d'eau, de 1% à 40% en poids d'un tensio-actif et de 0% à 19% en poids d'un co-tensio-actif.

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**Revendications pour les Etats contractants suivants : ES, GR**

1. Procédé de préparation d'une composition d'excipient mono-phasique formée spontanément, pour applications cosmétiques ou dermatologiques, dite composition présentant des formes isotropes ou des formes anisotropes, comprenant l'étape consistant à mélanger une huile perfluorée, de l'eau, et un tensio-actif présentant la formule:

25

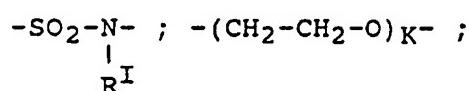


dans laquelle :

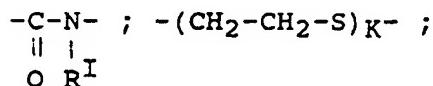
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$R_F$  est un groupe  $F-(\text{CF}_2-\text{CF}_2)_i^-$  ;  
 $X$  est un groupe choisi parmi :

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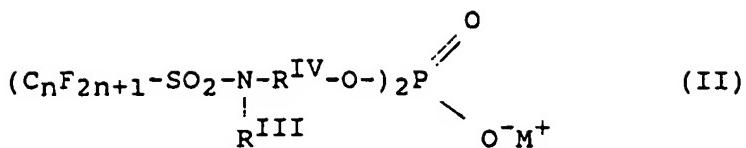
$R^I$  représentant un groupe alkyle en C<sub>1</sub>-C<sub>4</sub> ;  
 $Y$  est un groupe choisi parmi : NH<sub>2</sub>(R<sup>II</sup>)<sub>2</sub> et N(R<sup>II</sup>)<sub>4</sub> dans lequel R<sup>II</sup> représente un atome d'hydrogène ou un groupe choisi parmi -CH<sub>2</sub>-CH<sub>2</sub>-OH et alkyle en C<sub>1</sub>-C<sub>4</sub> ;

50

i est un nombre entier situé dans l'intervalle allant de 3 à 8 ;  
j vaut 0 ou 1 ;  
K vaut 2 I ;  
I est un nombre entier situé dans l'intervalle allant de 1 à 10 ;  
m vaut 1 ou 2,

ou bien la formule :

55



dans laquelle

n est un nombre entier situé dans l'intervalle allant de 3 à 10 ;

R<sup>III</sup> est un groupe alkyle en C<sub>1</sub>-C<sub>3</sub> ;

R<sup>IV</sup> est un groupe alkylène en C<sub>1</sub>-C<sub>3</sub> ;

M<sup>+</sup> est un ion ammonium ;

et éventuellement, un co-tensio-actif choisi parmi les alcools aliphatiques en C<sub>3</sub>-C<sub>7</sub>.

- 15 2. Procédé conforme à la revendication 1, dans lequel la composition est fluide, isotrope, présente une viscosité cinématique valant de 10<sup>-6</sup> m<sup>2</sup>/s à 5.10<sup>-5</sup> m<sup>2</sup>/s (de 1 à 50 cSt), possède une taille de particule inférieure à 40 nm (400 Å), et est constituée de :
- (a) 1% à 50% en poids d'huile perfluorée,
  - (b) 1% à 50% en poids d'eau,

20 (c) 8% à 60% en poids d'un tensio-actif, et

  - (d) 6% à 38% en poids d'un co-tensio-actif.
3. Procédé conforme à la revendication 2, dans lequel la taille de particule vaut de 5 nm à 20 nm (de 50 Å à 200 Å) et la composition est constituée de :
- (a) 15% à 35% en poids d'huile perfluorée,
  - (b) 30% à 50% en poids d'eau,
  - (c) 8% à 20% en poids d'un tensio-actif, et
  - (d) 6% à 15% en poids d'un co-tensio-actif.
- 30 4. Procédé conforme à la revendication 1, dans lequel la composition est anisotrope, présente une viscosité cinématique supérieure à 10<sup>-4</sup> m<sup>2</sup>/s (100 cSt) et une taille de particule supérieure à 1 µm (1 micron), et est constituée de :
- (a) 1% à 50% en poids d'huile perfluorée,
  - (b) 1% à 80% en poids d'eau,

35 (c) 1% à 40% en poids d'un tensio-actif, et

  - (d) 0% à 19% en poids d'un co-tensio-actif.
5. Procédé conforme à la revendication 4, dans lequel la composition comprend :
- (a) 20% à 45% en poids d'huile perfluorée,

40 (b) 45% à 70% en poids d'eau,

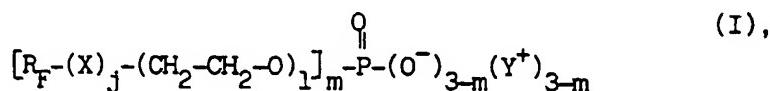
  - (c) 3% à 12% en poids d'un tensio-actif, et
  - (d) 0% à 8% en poids d'un co-tensio-actif.
6. Procédé conforme à la revendication 1, dans lequel l'huile perfluorée est choisie parmi les alcanes et cycloalcanes perfluorés, les amines perfluorées, les éthers perfluorés, cycliques ou non, et les composés hétérocycliques perfluorés.
- 45 7. Procédé conforme à la revendication 6, dans lequel l'huile perfluorée est choisie parmi le perfluoro-heptane, le perfluoro-octane, les perfluoro-alkyl-cyclohexanes dont le groupe alkyle comporte de 1 à 3 atomes de carbone, la perfluoro-décaline, les perfluoro-alkyl-décalines dont le groupe alkyle comporte de 1 à 3 atomes de carbone, la perfluoro-tripropyl-amine, la perfluoro-tributyl-amine, la perfluoro-triamyl-amine, les perfluoro-N,N-dialkyl-cyclohexylamines dont les groupes alkyle comportent de 1 à 6 atomes de carbone, les perfluoro-alkyl-tétrahydrofurannes dont le groupe alkyle comporte de 1 à 7 atomes de carbone, les perfluoro-alkyl-tétrahydropyrannnes dont le groupe alkyle comporte de 1 à 7 atomes de carbone, les perfluoro-alkyl-pipéridines dont le groupe alkyle comporte de 1 à 7 atomes de carbone, les perfluoro-alkyl-morpholines dont le groupe alkyle comporte de 1 à 7 atomes de carbone, et les mélanges de ces composés.
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### **Patentansprüche**

**Patentansprüche für folgende Vertragsstaaten : AT BE CH DE FR GB LI LU NL SE**

- 5 1. Spontan gebildete einphasige Exzipientszusammensetzung für kosmetische und dermatologische Anwendungen, in isotroper oder anisotroper Form, unfassend in Kombination:

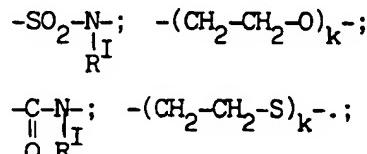
  - (a) ein perfluoriertes Öl;
  - (b) Wasser und
  - (c) ein grenzflächenaktives Mittel mit der Formel



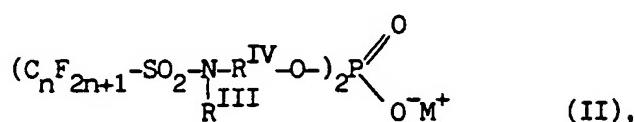
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worin:

R<sub>F</sub> eine F-(CF<sub>2</sub>-CF<sub>2</sub>)<sub>i</sub>-Gruppe ist;  
 X eine Gruppe, ausgewählt unter:



25	$O\ R^-$
	<p>-<math>(CH_2-O)_k^-</math>; und -<math>(CH_2-S)_k^-</math>;          bedeutet, worin <math>R^I</math> für (<math>C_1-C_4</math>) Alkyl steht;</p>
30	<p>Y eine Gruppe, ausgewählt unter:  <math>NH_2(R^{II})_2</math> und <math>N(R^{II})_4</math> ist,          worin <math>R^{II}</math> ein Wasserstoffatom oder eine unter -<math>CH_2-CH_2-OH</math> und (<math>C_1-C_4</math>)-Alkyl ausgewählte Gruppe darstellt;</p>
35	<p>i eine ganze Zahl im Bereich von 3 bis 8 ist;          j den Wert 0 oder 1 hat;          k für 2.I steht;          l eine ganze Zahl im Bereich von 1 bis 10 bedeutet;          m den Wert 1 oder 2 hat,</p>
	<p>oder mit der Formel:</p>



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worin:

- n eine ganze Zahl im Bereich 3 bis 10 bedeutet;
- $R^{III}$  für ein ( $C_1$ - $C_3$ )-Alkyl steht;
- $R^{IV}$  für ein ( $C_1$ - $C_3$ )-Alkylen steht;
- $M^+$  ein Ammoniumion darstellt,

50 und gewünschtenfalls ein co-grenzflächenaktives Mittel, ausgewählt unter den aliphatischen  $C_3$ - $C_7$ -Alkoholen.

- 55 2. Zusammensetzung nach Anspruch 1, worin die Zusammensetzung isotrop und flüssig ist, eine kinematische Viskosität von  $10^{-6}$  m<sup>2</sup>/s bis  $5 \cdot 10^{-5}$  m<sup>2</sup>/s (1 bis 50 cSt) aufweist, eine Teilchengröße unter 40 nm (400Å) besitzt und aus  
(a) 1 bis 50 Gew.-% perfluoriertem Öl;

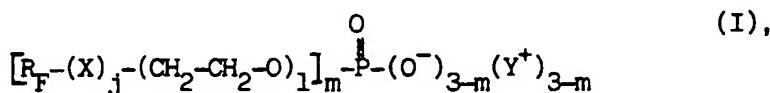
- (b) 1 bis 50 Gew.-% Wasser;  
(c) 8 bis 60 Gew.-% des grenzflächenaktiven Mittels und  
(d) 6 bis 38 Gew.-% des co-grenzflächenaktiven Mittels besteht.
- 5    3. Zusammensetzung nach Anspruch 2, worin die Teilchengröße von 5 nm bis 20 nm (von 50 Å bis 200 Å) beträgt und die Zusammensetzung aus  
    (a) von 15 bis 35 Gew.-% des perfluorierten Öls;  
    (b) von 30 bis 50 Gew.-% Wasser;  
    (c) von 8 bis 20 Gew.-% des grenzflächenaktiven Mittels und  
10    (d) von 6 bis 15 Gew.-% des co-grenzflächenaktiven Mittels besteht.
4. Zusammensetzung nach Anspruch 1, worin die Zusammensetzung anisotrop ist, eine kinematische Viskosität von über  $10^{-4}$  m<sup>2</sup>/s (100 cSt) aufweist und eine Teilchengröße von über 1 µm (1 Mikron) hat und aus:  
15    (a) von 1 bis 50 Gew.-% des perfluorierten Öls;  
    (b) von 1 bis 80 Gew.-% Wasser;  
    (c) von 1 bis 40 Gew.-% des grenzflächenaktiven Mittels und  
    (d) von 0 bis 19 Gew.-% des co-grenzflächenaktiven Mittels besteht.
- 20    5. Zusammensetzung nach Anspruch 4, umfassend:  
    (a) von 20 bis 45 Gew.-% des perfluorierten Öls;  
    (b) von 45 bis 70 Gew.-% Wasser;  
    (c) von 3 bis 12 Gew.-% des grenzflächenaktiven Mittels und  
    (d) von 0 bis 8 Gew.-% des co-grenzflächenaktiven Mittels.
- 25    6. Zusammensetzung nach Anspruch 1, worin das perfluorierte Öl unter perfluorierten Alkanen und Cycloalkanen; perfluorierten Aminen; acyclischen oder cyclischen perfluorierten Ethern; und perfluorierten heterocyclischen Verbindungen ausgewählt ist.
- 30    7. Zusammensetzung nach Anspruch 6, worin das perfluorierte Öl unter Perfluorheptan; Perfluoroctan; Perfluoralkylcyclohexanen mit 1 bis 3 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluordecalin; Perfluoralkyldecalinen mit 1 bis 3 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluortripropylamin; Perfluortributylamin; Perfluortriamylamin; Perfluor-N,N-dialkylcyclohexylaminen mit 1 bis 6 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluoralkyltetrahydrofuranen mit 1 bis 7 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluoralkyltetrahydropyranen mit 1 bis 7 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluoralkylpiperidinen mit 1 bis 7 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluoralkylmorpholinen mit 1 bis 7 Kohlenstoffatomen in ihrer Alkylgruppe; und entsprechenden Gemischen ausgewählt ist.
- 35    8. Zusammensetzung nach Anspruch 1, worin das co-grenzflächenaktive Mittel, soferne zugegen, Isopropylalkohol ist.
- 40    9. Verwendung der Zusammensetzung nach Anspruch 1 zur Formulierung von Cremen für kosmetische und dermatologische Anwendungen.
- 45    10. Verfahren zur Herstellung einer Zusammensetzung nach Anspruch 1, umfassend die Stufe des Vermischens des perfluorierten Öls, des Wassers, des grenzflächenaktiven Mittels und gegebenenfalls des co-grenzflächenaktiven Mittels, unter spontaner Ansbildung der Zusammensetzung durch das Mischen der Reaktanten.
- 50    11. Verfahren nach Anspruch 10 zur Herstellung der Zusammensetzung in flüssiger, isotroper Form mit einer kinematischen Viskosität von  $10^{-6}$  m<sup>2</sup>/s bis  $5 \cdot 10^{-5}$  m<sup>2</sup>/s (1 bis 50 cSt) und einer Teilchengröße von unter 40 nm (400 Å), umfassend die Stufe des Zusammenmischens von 1 bis 50 Gew.-% perfluoriertem Öl, von 1 bis 50 Gew.-% Wasser, von 8 bis 60 Gew.-% des grenzflächenaktiven Mittels und von 6 bis 38 Gew.-% des co-grenzflächenaktiven Mittels.
- 55    12. Verfahren nach Anspruch 10 zur Herstellung der Zusammensetzung in anisotroper Form mit einer kinematischen Viskosität von über  $10^{-4}$  m<sup>2</sup>/s (100 cSt) und einer Teilchengröße von über 1 µm (1 Mikron), umfassend die Stufe des Zusammenmischens von 1 bis 50 Gew.-% perfluoriertem Öl, 1 bis 80

Gew.-% Wasser, 1 bis 40 Gew.-% des grenzflächenaktiven Mittels und 0 bis 19 Gew.-% des co-grenzflächenaktiven Mittels.

**Patentansprüche für folgende Vertragsstaaten : ES, GR**

- 5 1. Verfahren zur Herstellung einer spontan gebildeten einphasigen Exziptionszusammensetzung für kosmetische und dermatologische Anwendungen, welche Zusammensetzung isotrope oder anisotrope Formen aufweist, umfassend die Stufe des Vermischens eines perfluorierten Öls, von Wasser, eines grenzflächenaktiven Mittels mit der Formel:

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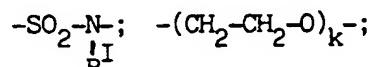


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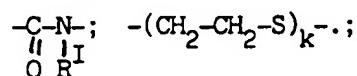
worin:

- $R_F^-$  eine  $F-(CF_2-CF_2)_i$ -Gruppe ist;  
 $X$  eine Gruppe, ausgewählt unter:

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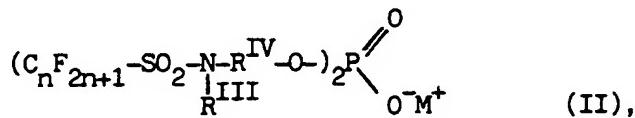


$-(CH_2-O)_k^-$ ; und  $-CH_2-S)_k^-$ ;  
bedeutet, worin  $R^I$  für ( $C_1-C_4$ )-Alkyl steht;

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- $Y$  eine Gruppe, ausgewählt unter:  
 $NH_2(R^{II})_2$  und  $N(R^{II})_4$  ist,  
worin  $R^{II}$  ein Wasserstoffatom oder eine unter  $-CH_2-CH_2-OH$  und ( $C_1-C_4$ )-Alkyl ausgewählte Gruppe darstellt;  
*i* eine ganze Zahl im Bereich von 3 bis 8 ist;  
*j* den Wert 0 oder 1 hat;  
*k* für 2*i* steht;  
*l* eine ganze Zahl im Bereich von 1 bis 10 bedeutet;  
*m* den Wert 1 oder 2 hat,  
oder mit der Formel:

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worin:

- $n$  eine ganze Zahl im Bereich 3 bis 10 bedeutet;  
*R<sup>III</sup>* für ein ( $C_1-C_3$ )-Alkyl steht;  
*R<sup>IV</sup>* für ein ( $C_1-C_3$ )-Alkylen steht;  
*M<sup>+</sup>* ein Ammonium darstellt,  
und gegebenenfalls eines co-grenzflächenaktiven Mittels, ausgewählt unter den aliphatischen  $C_3-C_7$ -Alkoholen.

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2. Verfahren nach Anspruch 1, worin die Zusammensetzung isotrop und flüssig ist, eine kinematische Viskosität von  $10^{-6} m^2/s$  bis  $5 \cdot 10^{-5} m^2/s$  (1 bis 50 cSt) aufweist, eine Teilchengröße unter 40 nm (400 Å) besitzt und aus

- (a) 1 bis 50 Gew.-% perfluoriertem Öl;  
(b) 1 bis 50 Gew.-% Wasser;  
(c) 8 bis 60 Gew.-% des grenzflächenaktiven Mittels und  
(d) 6 bis 38 Gew.-% des co-grenzflächenaktiven Mittels

5 besteht.

3. Verfahren nach Anspruch 2, worin die Teilchengröße von 5 nm bis 20 nm (von 50 Å bis 200 Å) beträgt und die Zusammensetzung aus

- (a) von 15 bis 35 Gew.-% des perfluorierten Öls;  
10 (b) von 30 bis 50 Gew.-% Wasser;  
(c) von 8 bis 20 Gew.-% des grenzflächenaktiven Mittels und  
(d) von 6 bis 15 Gew.-% des co-grenzflächenaktiven Mittels besteht.

4. Verfahren nach Anspruch 1, worin die Zusammensetzung anisotrop ist, eine kinematische Viskosität von über  $10^{-4}$  m<sup>2</sup>/s (100 cSt) aufweist und eine Teilchengröße von über 1 µm (1 Mikron) hat und aus:

- (a) von 1 bis 50 Gew.-% des perfluorierten Öls;  
(b) von 1 bis 80 Gew.-% Wasser;  
(c) von 1 bis 40 Gew.-% des grenzflächenaktiven Mittels und  
15 (d) von 0 bis 19 Gew.-% des co-grenzflächenaktiven Mittels  
20 besteht.

5. Verfahren nach Anspruch 4, umfassend:

- (a) von 20 bis 45 Gew.-% des perfluorierten Öls;  
(b) von 45 bis 70 Gew.-% Wasser;  
25 (c) von 3 bis 12 Gew.-% des grenzflächenaktiven Mittels und  
(d) von 0 bis 8 Gew.-% des co-grenzflächenaktiven Mittels.

6. Verfahren nach Anspruch 1, worin das perfluorierte Öl unter perfluorierten Alkanen und Cycloalkanen; perfluorierten Aminen; acyclischen oder cyclischen perfluorierten Ethern; und perfluorierten heterocyclischen Verbindungen ausgewählt ist.

7. Verfahren nach Anspruch 6, worin das perfluorierte Öl unter Perfluorheptan; Perfluoroctan; Perfluoralkylcyclohexanen mit 1 bis 3 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluordecalin; Perfluoralkyldecalinen mit 1 bis 3 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluortripropylamin; Perfluortributylamin; Perfluor-triamylamin; Perfluor-N,N-dialkylcyclohexylaminen mit 1 bis 6 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluoralkyltetrahydrofuranen mit 1 bis 7 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluoralkyltetrahydropyranen mit 1 bis 7 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluoralkylpiperidinen mit 1 bis 7 Kohlenstoffatomen in ihrer Alkylgruppe; Perfluoralkylmorpholinien mit 1 bis 7 Kohlenstoffatomen in ihrer Alkylgruppe; und entsprechenden Gemischen ausgewählt ist.

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